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GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Extension of the Royal Geographical Society's Hospitality to Fellows of the American Geographical Society in London. In a communication recently received from its secretary, Mr. Arthur R. Hinks, the Council of the Royal Geographical Society make known that the society has officially extended the hospitality of its house and an invitation to its meetings to any Fellows of the American Geographical Society who may be temporarily resident in London on war duty. It is hoped that as many Fellows as possible will avail themselves of the facilities so generously placed at their disposal.

NORTH AMERICA

Phototopographic and Aërial Surveying in the United States. Photographic methods have been employed in various forms for many years by surveyors in foreign countries, but the use of the camera in surveys in the United States was, until the commencement by the U. S. Geological Survey of the work in Alaska, confined to a very few special applications. Due to the enormous size and relatively small relief of a large part of our western country, the plane table has reached a high state of development in the United States. In a recent work by J. W. Bagley (The Use of the Panoramic Camera in Topographic Surveying, With Notes on the Application of Photogrammetry to Aërial Surveys, *U. S. Geol. Survey Bull. 657*) possibly the first authoritative account is given of the use of photographic surveying in the United States. (For an article on its use in Canada, by M. P. Bridgland, with general references on phototopography, see the *Review* for July, 1916.) Major Bagley himself has devised some new instruments and methods and has proved conclusively that the panoramic camera is extremely valuable in certain kinds of topographic work. It is shown that the field cost of surveys made by the use of panoramic camera and plane table is far lower than that of surveys made by the plane table alone, and, though the compilation of the field data in the office is more laborious, the final cost of the completed map is nevertheless lower.

Of special interest at this time is a chapter on ''The Application of Photogrammetry to Aërial Surveys,'' based largely on French treatises. Since the publication of this work, the War Department has afforded Major Bagley opportunity to try out his theories in practice. As a result a tri-lens camera and a special transformer have been developed, and Major Bagley is now engaged in training and putting into the field military aërial survey parties for the preparation of aëronautical maps. The appearance of a supplementary publication describing his further researches will be eagerly awaited.

James Gordon Steese

Tornadoes as Climatic Phenomena of the United States. No discussion of the climates of the United States is complete without reference to tornadoes. These have their fullest development over the great central lowlands of the country. They are peculiarly and characteristically American. Nowhere else in the world do they find equal opportunity. Nowhere else are they as frequent, as violent, as destructive, as here. It is from the larger climatic point of view that American tornadoes are considered in a recent paper by Professor R. DeC. Ward of Harvard University (''The Tornadoes of the United States as Climatic Phenomena,'' *Quart. Journ. Royal Meteorol. Soc.*, Vol. 43, 1917, pp. 317-320). The purely meteorological aspects of the tornado are given slight emphasis. But, as what a tornado *does* is determined by what it *is*, the nature of these phenomena is necessarily considered. The subjects taken up are damage and loss of life in tornadoes; distribution of tornadoes in place and time; tornado weather types; protection of life and protection of property, including tornado insurance. Three of Finley's charts of tornado damage are reproduced. There are four photographs of damage caused by the St. Louis tornado of May 27, 1896; and a new composite weather map, showing conditions favorable for tornadoes, is given. A bibliography is included.

The Different Meanings of the Terms "Leeward Islands" and "Windward Islands." Much confusion exists as to the meaning of the terms ''Leeward Islands'' and ''Windward Islands.'' Now that the interests of the United States in the Caribbean are becoming greater, the question assumes more direct importance for Americans. Practical need for a definition has been presented recently by the extension of the United States meteorological service in the West Indies. After consulting the Geographic Board, the Weather Bureau has adopted the following designation to be used in its reports: The term ''Leeward'' is to embrace the islands between the Anegada Channel and the island of Dominica, including the latter; the remainder of the chain, including Barbados, but excluding Trinidad and Tobago, is to be styled ''Windward'' (*Monthly Weather Rev.*, Sept., 1917, pp. 455-456).

It is to be feared that this grouping will not eliminate confusion, though it can scarcely add to that already existing in the usage of the terms. The U. S. Hydrographic Office, the British Admiralty in its ''West Indies Pilot,'' and the Spanish Naval Department in the official ''Derrotero'' (Pilot), each employs a different grouping of the islands under these names. Furthermore standard geographical handbooks and reliable maps rarely agree in the application of the terms. It is small wonder, since the problem offers a combination of historical, geographical, nautical, and political elements.

The names Leeward and Windward were purely nautical in their original application. The Spaniards were the first to employ them. The use of the terms ''Islas de barlovento'' (Windward Islands) and ''Islas de sotavento'' (Leeward Islands) depended upon the position of the navigator, the gateway by which he entered the archipelago, and the season in which he made his voyage. The names do not seem to have been applied in the West Indies until the end of the sixteenth century, and probably their use was not general until many years later. Early maps, such as Mercator's of 1538, that of Orontius Finaeus, 1566, the two of Peter Martyr, 1534 and 1587, and that of Ortelius, 1571(?), do not employ the terms at all. Neither does Alonso de Santa Cruz in his ''Islario General,'' 1560, though he gives a detailed account of the West Indies. The ''ruttiers'' in use among English navigators at the end of the sixteenth century make no mention of such grouping of the islands even when they list them individually, with great care giving distance and geographical location of the different ones. Juan López de Velasco, however, in his ''Geografía y Descripción Universal de las Indias'' (1574) speaks of Dominica as being one of the ''Islas de barlovento.''

The terms as used by the Spaniards were deeply significant in the days of sailing craft. Remembering the course taken by Spanish vessels going to America one can appreciate the application of the names. The trade wind path which Columbus had discovered in his second voyage was generally followed by other explorers and later by merchant ships. Early English, Dutch, and French navigators often reached America by much the same route. The Spanish traders, however, stuck closest to the course marked out by Columbus, due largely to the fact that, for safety from enemy corsairs and to comply with the government regulation of trade with America, their vessels were permitted to leave Spain but twice a year and must sail in fleets under naval escort. From 1561, when this system of convoyed fleets was established by law, until 1748, the year in which the plan was finally abandoned, Spanish commerce followed this path to the West Indies. Sailing from Spain in spring or summer, when the trade winds were constant but carried them far to the southward, they touched at the Canaries and from there steered for the easternmost islands of the Caribbean. The usual landfall was the little island significantly called ''Deseada'' (longed for). At Dominica or Guadeloupe, where there was wood, water, and good anchorage, a stop was made and the fleets were divided into two groups. One part went, still under escort, along the coast of the Spanish Main to Cartagena and Porto Bello on the Isthmus of Panama. The other, keeping within sight of the Greater Antilles, steered for Vera Cruz. When cargoes were discharged the ships all gathered in the harbor of Havana, where, as an old English writer quaintly says, ''the royal fleet of Spain doth ryde until winde and season do combine to wafte them homeward.'' At times vessels bound for Panama sailed from Spain as a separate fleet and entered the Caribbean near the island of Tobago, from there skirting the coast to the isthmus.

To sailors who followed these routes there were two groups of islands which came to bear the name Sotavento. These were the northern members of the Caribbees (possibly including the Greater Antilles; see ''Historical Geography of the British Colonies'' by Sir Chas. P. Lucas, Vol. 2, The West Indies, p. 33) and the islands along the coast of Venezuela, the westward extremes of the arc described by the entire chain of small islands. Herman Moll's map of 1710 is typical of the many that reflect this usage of the terms. The name Barlovento was applied to the chain of islands lying farthest to the east and apparently included all from Guadeloupe or Dominica to Trinidad. Rochefort in his ''Histoire Naturelle des Iles Antilles de l'Amérique'' (Paris, 1667, p. 118) makes St. Christopher the dividing point and lists the islands northwestward from there (St. Eustatius, St. Bartholomew, Saba, Anguilla, Sombrero, Anegada, the Virgin Islands, and St. Croix) as the ''Iles de dessous le Vent.''

In later usage there has been great diversity. The settlement of the islands by the English, Dutch, and French during the first half of the seventeenth century lessened the significance of the names as mere nautical terms, gave importance to the climatic effect of the more northerly winter trade winds, and also introduced a political element by the division of the islands among several powers. The English possessions in the Caribbees were formed into two administrative units as early as 1671, with the French colony of Guadeloupe as the dividing line between Leeward and Windward. But this political grouping has varied from time to time. The present designation ''British Leeward Islands'' is used to include Montserrat, Dominica, Antigua, St. Kitts (St. Christopher), and Nevis, to which are attached the smaller units of Barbuda and Redonda, Anguilla, and the British Virgin Islands. The ''British Windward Islands'' colony consists of St. Lucia, St. Vincent, the Grenadines, and Grenada. Preponderating English influence in the West Indies in the last two centuries has caused this political division largely to supersede the nautical and geographical grouping. The development of steam navigation in the nineteenth century finally robbed the original nautical terms of all their meaning. As a consequence the islands along the Venezuelan coast have been left without a group name, while the French and Dutch possessions and the former Danish West Indies are often understood to be excluded from the groups of which they form an integral part geographically.

In any attempt to harmonize the grouping of these islands the political factor should certainly be made secondary. A proper adjective may be prefixed to indicate the nationality of individual islands or small groups.

If weight be given to the history of the terms the correct application would be that in most common use among the Spanish navigators, and we should have the two groups of Leeward Islands, with Windward including those from Guadeloupe (or Dominica) to Grenada. If on the other hand we apply the terms with a purely geographical significance we should call only the Dutch-Venezuela group the Leeward Islands and make the term Windward include all from Grenada (or even Tobago) to Porto Rico (perhaps including the latter), since, with very insignificant exceptions, each unit of this Caribbee chain has a windward position during a considerable part of the year, the southern section being most directly exposed to the trades from May to November and the northern group during the remaining months.

"Northers" of the Panama Canal Region. The ''northers'' of the Gulf of Mexico, western Cuba, and the coasts of Mexico and Central America, have long been known. They are attracting more attention lately because of the increasing use of the Panama Canal. In a recent number of the *Monthly Weather Review* (Nov., 1917, pp. 546-549) there are some notes, historical and meteorological, on the ''northers'' of the Canal Zone. ''Northers'' are strong northwest to northeast winds, which blow at times from November to April. They last from one to as many as eight days and often cause damage to shipping, dock structures, etc. They result from the presence of a marked high pressure area to the northward, with steep gradients, and are essentially southward extensions of the ''cold waves'' of the United States. Four weather maps, illustrating typical conditions for the production of ''northers'' in the Canal Zone, are given.

R. DeC. Ward

EUROPE

Illustrations of Seasonal Migration from Switzerland and the Dinaric Countries. The pastoral nomad is a familiar figure in geographical literature; much less so the *transhumant,* though his life is particularly interesting from a geographical point of view. The transhumant is distinguished by the periodicity of his migrations and his possession of a fixed home. His economy is related to mountainous relief, and its chief determinant is climate. The conditions under which transhumance obtains notable proportions are defined by De Martonne as the proximity of high mountains habitable for five months of the year and plains semi-steppe in character subjected to summer drought. Such conditions may be found in the mountain borders of the Mediterranean. De Martonne himself made a special study of transhumance in the southern Carpathians (La vie pastorale et la transhumance dans les Karpates méridionales, ''Zu Friedrich Ratzels Gedächtnis,'' [Ratzel memorial volume], Leipzig, 1904), where the movement is persistent and long established. The Spanish meseta affords typical areas of transhumance though the recent improvement of economic conditions has greatly lessened its sway (see André Fribourg: La transhumance en Espagne, *Ann. de Géogr.,* Vol. 19, 1910, with 2 maps; article abstracted by O. Quelle and maps combined into one in *Petermanns Mitt.,* Vol. 56, II, 1910). The term transhumance indeed is of Spanish origin (*trashumar,* from *trans* and *humus*). Transhumance is known from the Iberian to the Anatolian peninsula and into Armenia and Persia, though in the two last regions, where it is practiced by Kurds and Tatars, it approximates to true nomadism. The Atlas region again is admirably adapted for transhumance, and here should be remarked the recent change from nomadism to this higher form of pastoral migration as the country has become peaceable under French rule. The way in which economic, social, and other strictly non-geographic factors enter into the control of transhumance is exceedingly interesting, but it is the geographic factors that are of first importance.

An illustration of transhumance in a region where it is combined with highly developed agricultural exploitation is given in a recent paper by Stanislas Lencewicz (La transhumance dans le val de Réchy, *Bull. Soc. Neuchateloise de Géogr.*, Vol. 25, 1916, pp. 106-121). The narrow, deep valley of Réchy, a left tributary of the Rhone in the canton of Valais between the Val d'Hérens and the Val d'Anniviers, has a long winter and is not inhabited permanently. The villages at the mouth enjoy only a scant precipitation (18 inches per year), and the inhabitants have recourse to the waters of the Rhone for irrigation. During the summer they use the pasturage on the glacially moulded valley shoulders and glacial cirques. These pasturages and their chalets are communal property; the business of the summer herding is also a matter of communal organization. The migration begins in May and by successive stages reaches the upper pastures, about 8,000 feet in elevation, at the beginning of July, to be completed during the second half of September. The herds are almost exclusively of cows, the making of cheese and butter being the primary object of the migrations. These products are divided among the individual owners according to the number and value of their herds.

On the westward slopes of the Dinaric Alps summer drought is intensified by the extreme development of karst phenomena. Transhumance is very widely distributed. Various forms of the migrations are described by Jevto Dedijer in the *Annales de Géographie* for September 15, 1916 (La transhumance dans les pays dinariques, Vol. 25, pp. 347-365). Towards the beginning of June, when the lower slopes of the Adriatic flanks of the Dinaric Alps, sunbaked and waterless, begin to be insupportable, the flocks of sheep are taken up to the summer pastures on the high mountains of Bosnia, Herzegovina, and Montenegro, three to six days' journey from the permanent villages. On the way the flocks and their herders, who are supplied by the private pastoral organizations, pass through an intermediate zone where live pastoralists who are not under the necessity of migrating in the summer. In the mountains a stay of about three months is made, until the first abundant rains of autumn, when return is made to the village. Of this simple form there are many modifications, dependent on morphological, hydrographic, and climatological variations in the area. Again, more complex causes account for such extremes as are represented by an "atavistic," or ancient surviving type, where a group is entirely pastoral and where all its members follow the annual migrations, to "decadent" forms obtaining in the fertile basins or *polyes*, where now are very few flocks. In some of the latter cases amelioration of the agrarian situation by the Ottoman government in the period 1850-60 led to increased agriculture and a more sedentary life.

On the eastern slopes of the Dinaric Alps, where approach to Central European types of climate and vegetation exists, transhumance takes on an entirely different form. Migrations are made at different seasons and are made down to the plains, instead of up to the mountains. On this side are heavier winter snows; the beasts are stabled during the winter—whence fodder becomes a problem. In autumn, after the summer harvests are gained, the flocks are taken to the plains, to return with the first fall of snow. They set out again at the end of February, are pastured in the plum orchards, and return about the end of April.

AFRICA

An African Scourge: The Tsetse Fly. Thirty-four years ago Europe definitely assumed the responsibility of the African problem. Today the issue of that problem is acute, and great is the need for an appreciation of the factors contributing to its peculiar difficulties. Not the least of these is the character of tropical Africa as a storehouse of deadly germ diseases. Notoriety in particular attaches to those diseases transmitted to man and beast by the tsetse fly. In this rôle and in virtue of its wide distribution the tsetse becomes one of the most serious barriers to progress. As early as 1851 Livingstone recognized the tsetse as "the scourge of Central Africa" (letter in *Bull. Amer. Geogr. Soc.*, Vol. 1, 1852-54, pp. 47-60). The characterization is as true today. "It [the tsetse] offers European civilization what is perhaps the most considerable obstacle against it," writes Roubaud in 1913 (E. Roubaud: Les mouches tsétsés en Afrique Occidentale Française, *Ann. de Géogr.*, Vol. 22, 1913). "The presence of the tsetse fly constitutes one of the greatest of the obstacles to our development of vast areas," says Fox of Northern Rhodesia (*Geogr. Journ.*, Vol. 48, 1916). Many specific instances might be quoted to confirm these statements. Perhaps the most striking is the case of the late ravages of sleeping sickness in Uganda. The disease entered the country from the Congo in 1901-02. At the end of 1903 the deaths from it numbered 90,000. Whole villages were wiped out and great tracts of fertile land, such as the Busoga shores of Victoria Nyanza, were desolated (geographical summary of the "Report on the Measures Adopted for the Suppression of Sleeping Sickness in Uganda" by Sir Hesketh Bell, *Colonial Repts. Misc. Cd. 4990,* 1909, in *Scottish Geogr. Mag.,* Vol. 26, 1910). Vast areas in Angola and the Congo where the disease is truly endemic have likewise been depopulated. "The difficulty in obtaining food from the natives is hardly credible to those who regard the Congo banks as populous and fertile; if they were more populous they could easily be made productive" (George Grenfell: The Upper Congo as a Waterway, *Geogr. Journ.,* Vol. 20, 1902). The maps of the Sleeping Sickness Bureau, London, 1909 (reproduced in *Petermanns Mitt.,* Vol. 56, II, 1910, Pl. 11), show the prevalence of the disease along the Congo mainstream and the Ubangi and suggest a reason for the lack of population. Density of population bears an important relation to future development in Central Africa. Already difficulty has been experienced in obtaining labor for the Katanga copper mines. Along the Lufira and other tributaries of the Lualaba draining the Katanga plateau sleeping sickness has carried off large percentages of the population (see maps accompanying the report by F. O. Stohr: La maladie du sommeil au Katanga, London, 1912). The ban on cattle-raising in tsetse fly zones is an incalculable loss not only locally to natives and white pioneers but in wider questions of transportation. Before the tsetse-haunted belt of equatorial forest the caravans of Islam were halted; Islamic influence, so dominant in North Africa, does not pass beyond the Sudan. In the late campaign against German East Africa the Rhodesian front suffered disability under the lack of animal transport. The corollary to this restriction is an expensive demand on human porterage in regions where labor is not superabundant.

Geographically the greatest interest in the tsetse problem lies in the distribution of the fly and the physical factors controlling that distribution. The two most important species of tsetse (*Glossina*) are *palpalis* and *morsitans.* The former is especially associated with sleeping sickness, the latter with the cattle sickness, locally known as *nagana,* though it has lately been proved that *morsitans* can also act as transmitter of a form of sleeping sickness. The distribution of *Glossina* is governed by conditions of climate, vegetation, and surface water (J. Schwetz: Preliminary Note on the Distribution of *Glossina palpalis* in the District of Lomani, Belgian Congo, *Annals Tropical Medicine,* Vol. 9, 1915, Liverpool). All tsetse demand shade. *Glossina morsitans* requires a certain degree of freshness and is not dependent on the immediate proximity of water. *Glossina palpalis* requires a warm damp atmosphere and the immediate presence of water. The limits of its altitudinal range appear to be about 4,000 or 4,500 feet. This species may be found anywhere in stretches of true equatorial forest where there is water, though it may further be carried into the savana regions by the gallery forests. Sleeping sickness, therefore, is characteristically a disease of western Africa—of the Guinea coast and the Congo.

Glossina morsitans, source of the cattle sickness, has a far wider distribution. It is found occupying belts of the savana country. The reason for restriction to these well-defined belts is not understood. Certainly *morsitans,* like other species, is highly sensitive to weather conditions, and it follows seasonal migrations within the limits of the belts, but as yet no satisfactory explanation of its range is forthcoming (Cuthbert Christy: Tsetse Flies and Fly-Belts, *Annals Tropical Medicine,* Vol. 11, 1917-18). Another vexed question concerns the relation of big game to the tsetse and the spread of disease. By certain authorities big game is considered as a reservoir of virus and its destruction or confinement to reservations has been seriously urged (Minutes of Evidence Taken by the Departmental Committee on Sleeping Sickness, *Blue Book Cd. 7350,* London, 1914). More practical seeming proposals have been put forward for elimination of the fly by clearing of rank natural vegetation. But to be economically possible such a measure requires to be followed by continued cultivation and hence must be of slow growth. Meanwhile for a less distant solution the problem demands further research and—it is essentially an international problem—co-operation between the nations responsible for the progress of Central Africa.

PHYSICAL GEOGRAPHY

Recent Developments in the Theory of Glacial Variations. Professor Raoul Blanchard, analyzing the hydraulic regimen of the Pre-Alps and the Great Alps (*Recueil des Trav. de l'Inst. de Géogr. Alpine,* Vol. 5, 1917, Grenoble) shows the influence of glacial sources of stream flow: the great contrast between stream regimens lies between the rain-fed streams with summer minimum and the glacier-fed streams with summer maximum. The sources of both streams are liable to fluctuations. The glaciers advance and retreat; their variation is reflected in stream discharge. Today, when we know the Alps as the great storehouse of hydro-electric power, stream discharge is a matter of practical importance. As Charles Rabot says at the conclusion of his paper "Récents travaux glaciaires dans les Alpes françaises" (*La Géographie,* Vol. 30, 1914-15), the study of glacial variations is far from being merely one of academic interest.

In the autumn of 1913 of one hundred glaciers of the Swiss Alps 33 were in a state of advance, 8 were stationary, 59 were in retreat: in 1916 there were 64 in advance, 8 stationary, and 28 receding. Variation is not simultaneous; nor from an examination of regional distribution is there any apparent law governing this differential variation. In 1914-15 the Great Aletsch Glacier retreated 6 meters, while its close neighbor the Fiesch advanced 11 meters. The regular series of observations now being carried out on the Alpine glaciers show that the problem of glacial variation is not so simple as it appeared to be when Forel in 1900 essayed to fix its laws. Forel enunciated as one of these laws the statement that glacial variations are changes of volume and not of form. The volume of a glacier may be said to represent the balance between the two factors regulating glacial economy, nivation and ablation, that is to say ultimately between precipitation and temperature. The volume of the glacier is distributed between its upper part, the collector, where nivation exceeds ablation, and the dissipator, or lower part, where ablation exceeds nivation. Glacial flow has been regarded as continuous; hence an increased volume in the collector has supposedly been followed by increased volume in the dissipator. If this be so it is difficult to explain the lack of uniform response of glaciers in the same region to the same climatic variations. But lately careful observations and refined measurements have demonstrated the occurrence of movements affecting the form as well as the volume. In particular glaciers, besides the slow forward movement of the glacial body, waves of intumescence have been observed to pass through the mass, and this wave movement has in all cases been accompanied by general deformation and crevassing of the glacier front. The phenomenon was admirably observed in Yakutat Bay in 1899, when in a few months the unbroken, moraine-covered valley glacier was changed to a sea of crevasses. This development, accompanied by a great movement of advance, had been preceded by an unusually violent earthquake. A probable explanation sees the cause in the dislodgment of enormous masses of ice from the surrounding heights onto the glacier, leading to a sudden forward thrust. The idea of the sudden forward movement advocated in this abnormal case may be carried to the interpretation of normal cases. Nivometric studies in the Alps confirm the conception of discontinuous flow; the slow accumulation in the collector, sudden discharge from it. According to such a conception a glacier will not necessarily react at once to climatic variation. If, however, the variation be sustained, the glacier must ultimately respond; whence during well-marked periods of climatic variation we find all the glaciers of a region behaving similarly. The great Alpine extensions at the end of the sixteenth century, at the beginning and in the middle of the nineteenth century, between 1810 and 1825 and towards 1855, were all universal (P. L. Mercanton: Les variations des glaciers actuels, *Rev. Gén. des Sci.,* Nov. 30, 1917, pp. 631-636; translated in the *Scientific American Suppl.,* March 30, 1918. See also A. G. Ogilvie: Some Recent Observations and Theories on the Structure and Movement of Glaciers of the Alpine Type, *Geogr. Journ.,* Vol. 40, 1912).

ECONOMIC GEOGRAPHY

A Persistent Superstition: The Divining Rod. There has been recently quoted the tale of an Australian sapper who by means of the divining rod discovered water on the arid beaches of Anzac. Under less dramatic circumstances the method is still customary in the sheep-farming regions of Australia and in other regions where water is scarce. It has been the subject of recent controversies in western Europe, and in this country it is credited to an extent that has led the U. S. Geological Survey to issue a special warning (Arthur J. Ellis: The Divining Rod: A History of Water Witching, *U. S. Geol. Survey Water-Supply Paper 416,* 1917). This, however, is not the first condemnation published by the Survey. In *Mineral Resources of the United States for 1882* the superstition was attacked by R. W. Raymond. Raymond pointed out that the surface signs of ground water are easily recognized by the experienced observer, who may acquire an empirical knowledge remarkable for its unconscious acumen; he instances the seemingly uncanny skill of the Indian of the desert West and the art learned from him by the frontiersman. Again, in the case of the artesian well, if a person "has sufficient practical judgment to decide that a certain area or line would probably be suitable for boring, he is pretty sure to be safe in selecting any point of it." With the discredited divining rod go the recent devices described in *Water-Supply Paper 416* under the category of "mechanical water finders." They are the latest expressions of a remarkably persistent superstition the history of which has given rise to a considerable literature: the bibliography given covers 28 pages!

Crops and Temperature. The relations between crops and weather conditions are highly complex. Many factors enter into the problem. These are not meteorological controls alone. They are also soil conditions, the character of the seed, the time of planting, the methods of cultivation, and the like. Hence the determination of definite relationship is difficult, often impossible. Special attention has lately been paid to rainfall controls. A recent study in agricultural meteorology by D. A. Seeley deals with the temperature element (abstracted in *Monthly Weather Rev.*, July, 1917, pp. 354-359). What the author has in view is the determination of the heat requirements of each crop and a method of evaluating air temperature records in terms of their efficiency to meet these requirements. The method most generally employed is the "summation process," so-called. This consists in adding together the mean daily air temperatures during the life phase of a crop in order to find the thermal requirement. The results differ widely from year to year. Van 't Hoff's law, introducing the exponential method, does not take account of the optimum temperature for growth and fails to produce consistent results. Livingston's "physiological index" method of evaluating temperatures, while "based on a reasonable footing," is not satisfactory. The author believes that the temperature of the plant itself deserves more consideration. This is much higher than the air temperature, in sunshine. Observations at East Lansing, Mich., in 1915-16, show that the excess of plant temperature over air temperature averages about 15° in clear, 10° in partly cloudy, and less than 1° in cloudy weather. Curves expressing plant-growth rates and plant temperatures show more decided parallelisms than appear when other temperatures are considered. A formula is evolved for use in determining the effectiveness of air temperature in promoting crop development. R. DeC. Ward

GEOGRAPHICAL NEWS

OBITUARY

Hubert Howe Bancroft, the noted historian, died at Walnut Creek, Cal., near San Francisco on March 2 at the age of 86. He is best known for his "History of the Pacific States of North America" (34 vols., 1882-90; preceded by "The Native Races of the Pacific States of North America," 5 vols., 1874-76). The writing of this monumental work was only made possible by a system of card indexing he devised to digest the enormous amount of source material and the training in its use of a corps of research assistants and collaborators. Mr. Bancroft was a Fellow of our Society.

Professor Paul Vidal de la Blache of the University of Paris, the dean of French geographers, died on April 5 at the age of 73. Professor Vidal de la Blache, who numbered most of the leading geographers of France among his pupils, may fitly be termed the father of the modern French school of geography, a school which, in its combination of scientific accuracy with a sense of proportion, has made all geographers its debtors. Among his leading works may be mentioned: the "Atlas Général Vidal-Lablache," first appearing in 1890 and kept up to date in succeeding editions, of the maps of which it has truly been said that many "are marked by great ingenuity of conception, and several are unique to this atlas"; the admirable "Tableau Géographique de la France," published as the introductory volume of Lavisse's "Histoire de France" in 1903 and also separately in 1908; and his last work "La France de l'Est: Lorraine-Alsace," published in 1917, which was abstracted *in extenso* in the April *Review* (Vol. 5, 1918, pp. 328-329). A detailed account of his life and achievements, by his son-in-law, Emmanuel de Martonne, and Professor Lucien Gallois, will be found in the "Geographen Kalender" for 1910 (Justus Perthes, Gotha). Another, by Professor Gallois, appears in the latest number of the *Annales de Géographie* (May 15, 1918, pp. 161-173). Professor Vidal de la Blache was awarded the Charles P. Daly Medal of this Society in 1915.

CORRESPONDENCE

To the Editor of "The Geographical Review":

The undersigned trusts that it will be possible to print the following reply to Professor Mark Jefferson's criticism in the November *Review* (Vol. 4, 1917, pp. 399-400) of his article on "The Monsoon." Professor Jefferson writes "Mr. Wallis bases his objections on alleged facts" and appeals to the evidence in Dr. Herbertson's well-known paper published in 1901 (The Distribution of Rainfall Over the Land) and apparently ignores the illustrative data which are appended to the article under criticism. We have, therefore, an apparent conflict of authorities, so perhaps I may be allowed to specify more